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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/990,408

11/21/2001

Kazuyoshi Kubota

073600.P020D

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09/07/2004

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EXAMINER

KIM, PAUL D

ART UNIT

PAPER NUMBER

3729

DATE MAILED: 09/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/990,408

Applicant(s)

KUBOTA ET AL.

Examiner

Paul D Kim

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This office action is a response to the amendment filed on 6/14/2004 and 6/17/2004.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 15-20, 22-27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seagle (US PAT. 5,764,446).

Seagle teaches a process of making a magnetic head comprising steps of: forming a thin film magnetic head element (110) including a magnetoresistance (MR) element (120) over a substrate (100) as shown in Figs. 1A-1B; cutting the substrate to form a plurality of magnetic heads; and polishing (lapping) a side surface of the cut substrate as shown in Fig. 4 to expose the magnetoresistance element (350) (see also, col. 5, line 31 to col. 8, line 65). Seagle discloses that the ABS has been lapped and polishing to provide the final ABS disclosed in col. 8, lines 2-14. Even though Seagle does not disclose a magnetically degenerated layer formed on the side surface, the magnetically degenerated layer (having certain thickness as recited in claim 26) can be removed during the lapping process as shown in Fig. 4. Additionally, if there was the magnetically

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degenerated layer in the magnetic head device, the magnetic head device of Seagle would not operate as intended. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify a process of fabricating a magnetic head device of Seagle by removing the magnetically degenerated layer by polishing the ABS in order to produce good quality of the magnetic head device.

As per claims 16 and 17 the etching and milling processes recited in the claimed invention are equivalent with the lapping process disclosed by Seagle to remove a portion of the magnetoresistance element as shown in Fig. 4.

As per claim 18 Seagle also teaches processes of forming a first shield layer (330) over the substrate (100); forming a first half gap layer (340) over the first shield layer; forming the MR element over the first half gap layer; forming a second half gap layer (360) over the MR element; and forming a second shield layer (365) over the second half gap layer as shown in Fig. 3.

As per claims 19 and 20 although Seagle remains silent with respect to the MR stripe height, a target stripe height of the magnetoresistance element (350) as shown in Fig. 4 is formed after the lapping process to provide the final ABS as disclosed set forth above. If there was the magnetically degenerated layer in the magnetic head device, the stripe height is equal to the target stripe height plus a depth of the magnetically degenerated layer. It is also old and well known of art in the magnetic head art to routinely modify a magnetic head structure inclusive of MR stripe height in the course of routine optimization and experimentation. Additionally, it is also known in the art that by reducing the

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stripe height of the MR element, there is an increase the shape of anisotropy given the same width, thereby reducing Barkhausen noise.

As per claim 22 Seagle also teaches a process of forming an inductive head element (130) over the substrate as shown in Fig. 1B. The inductive head element comprises an upper (390) and lower magnetic pole layers (365) separated by a gap layer (370).

As per claim 23 the lower magnetic pole layer is common with the second shield layer (365) (see also, col. 7, lines 52-59).

As per claim 24 Seagle also teaches that the ABS is lapped and polished (equivalent with machining) to provide the final ABS.

As per claims 25 and 27 at the time the invention was made, it would have been an obvious matter of design choice to a person of ordinary skill in the art to apply the insulating material as recited in the claimed invention because Applicant has not disclosed that the brazing material as recited in the claimed invention provides an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with Seagle because the insulating material as recited in the claimed invention would perform equally well with the alumina (equivalent with material recited in claim 25) in Seagle. Therefore, it would have been an obvious matter of design choice to modify the insulating material of Seagle to obtain the invention as specified in claim 25. Also, both the materials recited in claim 25 as a non-alumina based nonmagnetic material (as per claim 27) and the alumina material are recognized as inorganic

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dielectrics that provide good insulative and high yield qualities. Therefore, no new or unobvious result is seen to be obtained by substituting the art recognized equivalents.

As per claim 29 a non-magnetic undercoat layer (320) is formed on the substrate as shown in Fig. 3.

3. **Alternatively**, claims 15-20, 22-27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seagle in view of Hamakawa et al. (US PAT. 4,814,921).

If applicant still does not agree with examiner removing the magnetically degenerated layer during the polishing process, Hamakawa et al. teach a process of making a thin film magnetic head including a process of removing the degenerated layer during the fabricating process for the thin film magnetic head in order to prevent the deterioration (see also col. 9, lines 4-35). Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify a process of fabricating a magnetic head device of Seagle by removing the magnetically degenerated layer as taught by Hamakawa et al. in order to prevent the deterioration of the magnetic head device.

As per claims 16-20, 22-27 and 29 the rejections are described as set forth above.

4. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seagle in view of Hamakawa et al., and further in view of Kitao et al. (US PAT. 6,198,600).

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Seagle, modified by Hamakawa et al., teaches all of the limitations as set forth above except a process of coating the side surface with a diamond-like carbon material after removing the magnetically degenerated layer. Kitao et al. teach a process of making a thin film magnetic head including a process of coating the diamond-like carbon (DLC) material after machining process for protecting the exposed surface after the machining process from oxidation or corrosion (see also col. 1, lines 32-39). Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify a process of fabricating a magnetic head device of Seagle, modified by Hamakawa et al., by coating the diamond-like carbon (DLC) material to the exposed surface as taught by Kitao et al. for protecting the exposed surface after the machining process from oxidation or corrosion.

5. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seagle in view of Hamakawa et al., and further in view of Mino (US PAT. 6,188,544).

Seagle, modified by Hamakawa et al., teaches all of the limitations as set forth above. However, Seagle does not teach that an etching rate of a magnetic material of the first shield layer and upper and lower magnetic pole layers is substantially the same as an etching rate of the non-alumina based nonmagnetic material. Fig. 4-5 of Mino teaches a method of making a thin film magnetic head having a recording gap layer (46) made of Ta_2O_5 or SiO_2 , which is non-alumina base nonmagnetic material having approximately the same milling rate with the upper or lower magnetic poly layer for improving thermal conductivity and

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thermal reliability of the magnetic head (col. 4, lines 40-60). Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify a recording gap layer of Seagle, modified by Hamakawa et al., by materials of non-alumina base nonmagnetic material having approximately the same milling rate with the upper or lower magnetic poly layer as taught by Mino because the shape of the pole layers can be easily controlled and improves thermal conductivity and thermal reliability of the magnetic head.

Response to Arguments

6. Applicant's arguments with respect to claims 15-29 have been considered but are moot in view of the new ground of rejection. Rejections are based on the newly cited reference.

7. Applicant's arguments filed 6/14/2004 have been fully considered but they are not persuasive. Applicant argues that the prior art of record fails to disclose the claimed invention such as removing a magnetically degenerated layer from at least a region of the side surface that includes a part of the thin film magnetic head element. Applicant noted that the magnetically degenerated layer are formed by the mechanical lapping or polishing of the ABS surface and then further lapping and polishing could somehow remove the magnetically degenerated layer simultaneous with its generation. Examiner traverses the argument. There is no such a recitation in the claimed invention for process of further lapping and polishing could somehow remove the magnetically degenerated layer simultaneous with its generation. According to claim 1,

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examiner reads that the removing process for the magnetically degenerated layer is followed by the polishing process. It means that the magnetically degenerated layer if any exists is removed during the polishing process as taught by Seagle. Also, Hamakawa et al. teach a process of removing the degenerated layer during the fabricating process for the thin film magnetic head in order to prevent the deterioration. It would be obvious to modify a process of fabricating a magnetic head device of Seagle by removing the magnetically degenerated layer as taught by Hamakawa et al. in order to prevent the deterioration of the magnetic head device.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will

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the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul D Kim whose telephone number is 703-308-8356. The examiner can normally be reached on Tuesday-Friday between 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Vo can be reached on 703-308-1789. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

pdk



A. DEXTER TUGBANG
PRIMARY EXAMINER